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The Role of Coca in the History, Religion, and Medicine of South American Indians

RICHARD T. MARTIN[1]

Of all the plants which modern science has adopted from the materia medica of South American Indians, the coca shrub, *Erythroxylum coca* Lamarck of the Erythroxylaceae, is perhaps the most famous. Coca leaves have been widely used in South America as a masticatory and medicine for over two thousand years. The plant is extensively cultivated in eastern Peru and Bolivia between 1,500 and 6,000 meters in the warm, moist valleys of the montaña. On a smaller scale, the plant has been cultivated also in northern Chile, Ecuador, southern Colombia and the Sierra Nevada de Santa Marta, and throughout the Amazon Basin, as well as in many countries in the Old World. Although no examples of truly wild coca are known, the presence of several similar wild species in the montaña region of Peru and Bolivia suggest this as the probable area of origin of the cultivated species. Many distinct varieties of coca are found under cultivation, several frequently occurring in the same plantation. Botanists often regarded certain of these varieties as distinct species i.e. *E. novogranatense* (Morris) Hieronymus, *E. truxillense* Rusby, and *E. bolivianum* Burck. Since, however, the plant shows great plasticity under different ecological conditions and virtually nothing is known of the genetics of the plant, it seems best to regard these as cultivated varieties rather than distinct species, until cytological research and hybridization experiments can determine the significance of the variation.

The coca plant is a shrub of approximately one meter in height with a number of striking botanical characteristics. The leaves have very distinctive longitudinal areolate lines curving toward the midrib which are merely thickenings in the epidermal cells resulting from the manner of unfolding of the leaf. At the base of the petiole there are characteristic ovate intrapetiolar stipules. The creamy white flowers are about one centimeter long with five sepals and five petals. Each petal has a distinctive clawed appendage on its inner surface; in the intact flower these unite to form a crown. The 10 slender stamens are basally united into a short membranaceous cupule with short denticulations outside and between the filaments at the rim. The pistil possesses a three-locular superior ovary with a single ovule suspended from each locule. The plant is heterostylous, i.e. the three yellowish green styles may be either shorter or longer than the stamens. In the ripening of the fruit, two of the ovules abort, and the locules are obliterated. The fruit is an ovate red drupe with one seed.

The remarkable physiological activity of coca is due primarily to its alkaloids: to date, some 14 alkaloids have been isolated from varieties of the coca plant. The alkaloids belong to the tropane series, together with atropine and scopolamine from the Solanaceous genera *Datura*, *Hyoscyamus*, *Atropa*, etc. The coca alkaloids are a mixture of ecgonines, tropeines and hygrines. The ecgonine derivatives include cocaine (methyl benzoyl ecgonine), methyl ecgonine and cinnamyl cocaine; the tropeines include tropeine and pseudotropine, dihydroxypeine, tropacocaine and benzoyl tropane; the hygrines include hygrine, hygroline and cuscohygrine. The stereoisomers α- and β-truxilline have also been isolated from coca leaves, and nicotine has been reported.

The isolation of cocaine from coca leaves by Niemann of Göttingen in 1860 and the discovery of its application in local anaesthesia by Dr. Carl Koller in 1884 constituted major advances in the science of pharmacology, and gave the coca plant and its derivatives an important place in the development of modern medicine. However, the dis-

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FIG. 1. Koreguaje boy with coca shrub. (Upper Río Caquetá, Colombia. Photograph by R. E. Schultes.)

covery of cocaine had another less beneficial effect on the reputation of the coca plant; for the occasional abuse of this alkaloid, particularly among persons already addicted to opiates, which was sensationalized by the press both in Europe and the United States at the end of the 19th Century, created the erroneous fear that coca equalled opium in its perniciousness and its deleterious effect on physical and mental health. In the space of 20 or 30 years, coca went from high praise by kings, popes, artists and doctors as the most beneficial stimulant tonic known to man to vigorous condemnation as a dangerous addictive narcotic. The effect of this prejudice and the subsequent legal ban on coca leaves in Europe and the United States was to halt experimentation with and use of coca leaves by doctors; only specialized uses of cocaine in anaesthesia were regarded as acceptable. Even more serious, however, is the fact that confusion about the effects of crude coca leaves and those of cocaine has caused many people to regard the chewing of coca leaves as practiced by the Indians of South America as merely an addictive vice, with the lamentable result that coca is now being suppressed even in areas where the Indians have relied on its stimulating and medicinal properties for thousands of years, and where it has formed a significant part of their religious and cultural heritage.

My purpose here is to review briefly the importance of coca leaves in the lives of South American Indians with particular em-

FIG. 2. Fruits and buds of *Erythroxylum coca* Lam. (Photograph by T. Plowman.)

phasis on its role in indigenous medicine and religion. Only appreciating the use of coca from the point of view of the Indians' cultural heritage, their beliefs, and the necessities of their daily lives can give a proper perspective on the meaning of coca to these people. In examining the literature on coca, one notices the fact that those authors—scientists and laymen alike—who have spent time living, working and making friends with the Indians have been the most ready to emphasize coca's beneficial effects and lack of serious deleterious effects, which in many cases they corroborated by personal experiences with the drug; on the other hand, the most derogatory and condemning reports have come from travellers like Poeppig, who admitted his distaste for Indian customs, or from officials and doctors who have had little if any experience with Indian life.

Perhaps the most ancient use of coca in South America is its employment in various shamanistic practices and religious rituals. As is the case with tobacco, the Indian medicine man valued coca specifically for its narcotic effects; the mild mental excitation which follows the mastication of the leaves enabled him to enter more easily into a trance state in which he could communicate with the spiritual forces of nature and summon them to his aid. The Indians' spiritual practices of fasting, meditation, incantations and dancing appear to be in every way analagous to similar shamanistic and religious practices found in the Old World.

This power of coca to enhance the effectiveness of meditation and incantations and to produce trance states is responsible more than any other factor for its reputation as a divine plant. The religious importance of coca is seen even in the earliest evidences for its use. Mochican pottery from the Classic Epoch of the northern coast of Peru (around 500 AD) contains numerous examples of painted scenes of coca chewers and molded vessels showing the characteristic distended cheeks of coca chewers which indicates that coca was used by persons of high rank, probably priests. The Incas regarded coca as the most sacred of plants, as a "living manifestation of divinity, and the

FIG. 3. Nasca jar depicting wounded warrior with an *acullico* in the left side of the mouth. (From Yacovleff and Herrera, "El Mundo Vegetal de los Antiguos Peruanos," p. 298).

place of its growth a sanctuary where all mortals should bend the knee."[2] Garcilasso Inca de la Vega, an early chronicler of mixed Spanish and Incan ancestry, recounts the legend that the children of the Sun presented the Incas with the coca leaf to satisfy the hungry, provide the weary and fainting with new vigour and to cause the unhappy to forget their miseries. Under the Inca Empire, the use of coca was restricted largely to the nobility and priests; a gift of coca was considered one of the highest marks of imperial favor. At the *huaraca*, or initiation ceremony for young Inca nobles, the young men competed in foot races, while young maidens stood along the course offering coca and chicha and crying, "come quickly youths, for we are waiting."[3] At the

[2] Unanue, 1794.

[3] Mortimer, p. 70.

end, each youth was invested with a *huaraca* or sling and the *chuspa* filled with coca leaves to symbolize his new manhood. Coca was also presented to the nobles of newly conquered tribes when they were assimilated into the empire. All of the records, traditions and history of the Inca empire were handed down by court orators or *yaravecs*, individuals with phenomenal memories who related the history of the race in detail at royal councils, aided only by a system of knotted strings, the *quipu*. The *yaravecs* were permitted the use of coca to strengthen their capacity for recollection; this tradition stands in contrast to some modern authors who have claimed that coca retards the memory and dulls the intelligence. Special sacrifices of coca were made at Incan ceremonies at the Temple of the Sun in Cuzco, and it was considered essential that supplicants should approach the alter only when they had coca in their mouths. As the most important vegetal offering, coca was sacrificed at virtually all religious festivals, the leaves being thrown to the four cardinal points or burnt upon the altars. Coca was also frequently used for purposes of divination; the Incas believed in consulting supernatural powers before undertaking any important action. Frequently diviners would chew coca leaves and spit the juice into their palms with the two longest fingers extended: if the juice ran down both fingers equally the augury was good; if unequally, it was bad. Other diviners would burn coca leaves with llama fat and watch the way in which they burned.

Following the destruction of the Inca empire by the Spaniards, the use of coca became much more general among the masses; nonetheless, it retained its place as the divine plant and has been used by the Quechua Indians in all offerings and religious rites up to the present time. When a pack train is ready to depart, the Indians throw coca in the air to propitiate the gods of the mountain and ensure a safe trip. Piles of sacred stones, originally dedicated to *Apachic* or *Pachacamac*, now with rude crosses placed on them by missionaries, are scattered along the paths in dangerous mountain passes; as an offering and to ask for continued strength and endurance, the Indian will throw his quid of coca against the rocks. Coca is also periodically offered to the earth mother to ensure good crops or before inserting the corner stones of a new house, and a young man frequently takes offerings of coca to a girl's parents to obtain their consent for marriage. In graves where mummies are found, there is always a supply of coca in *chuspas*, and frequently a quid has been placed in the mouth of the deceased to give him strength on his journey. Poeppig relates a common Indian belief that, if a dying man can appreciate the taste of coca leaves pressed to his lips, his soul will enter paradise.

Coca was equally important in the spiritual life and religious rituals of many other groups of Indians, particularly among the Chibcha of Colombia and the Aymara of Bolivia. Among the Chibcha, coca was used by the priests (cheque) for divining. After 12 years of training, a cheque's ears and nose were pierced and he was invested by the ruler with a pointed mantle and a calabash container for his coca. Among the Aymara, coca is chewed at all ceremonial occasions such as marriages and wakes. When a new headman of an *ayllu* or district is introduced by his predecessor, he takes a drink and a pinch of coca with every household head. The chief method of divination among the Aymara is through the medium of coca. Coca divination is practiced not only by diviners (*yatiri*) but also by black magicians (*laiqa*), white magicians (*paq*) and healers (*qolasiri*).

The most accurate and complete account of the religious uses of coca among modern Indians is Reichel-Dolmatoff's report on the significance of coca among the Kógi, a group of Indians of the Sierra Nevada de Santa Marta which has been sufficiently isolated to retain many tribal traditions. Among the Kógi the use of coca is restricted to the males. After the evening meal, the men either retire to meditate and chew coca or they go to the ceremonial house to chew coca and spend the night dancing, chanting, and having ceremonial conversations with "Los Antiguos." Reichel-Dolmatoff's account gives a clear description of their motives for chewing coca: "Upon the effect of the coca, the Kógi emphasizes in the first place that its consumption brings a certain

FIG. 4. Moche vase showing consumer of coca holding a calabash in one hand and a small stick for extracting the lime in the other. Note the chuspa for carrying coca leaves hanging on the left side. (From Yacovleff and Herrera "El Mundo Vegetal de los Antiguos Peruanos," p. 298.)

mental clarity which one ought to take advantage of for ceremonial gatherings and any religious act in general, being conversations, personal rites, or group rites. Evidently the coca causes a euphoric state which lasts for a long period and is prolonged by the gradual consumption of larger and larger quantities. The individual turns into an animated speaker, and says that he feels an agreeable sensation of tingling over all the body and that his memory is considerably refreshed which permits him to

speak, sing, and recite during the following hours. In the second place the Kógi say that coca appeases hunger. According to them, however, this never is the object of consuming coca but only an agreeable consequence, seeing that during the ceremonies or ceremonial conversations the consumption of food is prohibited and the assistants ought to fast. Another effect which is attributed to the coca is insomnia. Here again the Kógi see an advantage since the ceremonial conversations should be carried on at night and individuals who can speak and sing for one or several nights without sleep, merit high prestige. The Kógi ideal would be to never eat anything beside coca, to abstain totally from sex, to never sleep, and to speak all of his life of the "Ancients," that is to say, to sing, to dance and to recite."[4]

The utilization of coca leaves by Indian laborers and travellers to reduce muscular exhaustion and alleviate hunger and thirst has been widely reported by various authors, and is perhaps the most widely known of the uses of coca. The Incas recognized coca's power to increase endurance, and the *chasquis* or relay messengers and the soldiers were enabled to endure incredibly long marches at high speed by chewing coca. The Spaniards were likewise quick to recognize this capacity of the drug since it enabled the Indians to perform more work with less food; unfortunately, the mine and plantation owners too frequently abused this property of coca and forced the Indians to work unbelievably long hours—up to forty-eight hours at a time—without adequate nourishment or rest. The Indians of the Peruvian Sierra are famous for their ability to travel rapidly along mountain paths with heavy burdens, sustained only by an occasional *acullico* or chew of coca. The Sierra Indians are even accustomed to measuring the length of a journey by the hours that one chew of coca will sustain them in their journey—a period of time called the *cocada*. The *cocada* is more a measurement of time than distance; the first influence of the leaves is felt within ten minutes, and the effect lasts about 45 minutes in all, during which time the Indian will cover about three kilometers on level ground or two kilometers going uphill. Lloyd, in his study on the use of coca by the Momberos of Colombia, describes the incredible endurance of Indian porters near Popayán: "After eating a simple breakfast of ground corn porridge they would start with their heavy packs, weighing from seventy-five to more than one hundred pounds, strapped to their backs. All day long they travelled at a rapid gait, over steep mountain spurs and across mucky swamps, at an altitude that, to us, without any load whatever, was most exhausting. On these trips the Indians neither rested anywhere, nor ate at noon, but incessantly sucked their wads of coca throughout the entire day. These Indians we found very pleasant, always cheerful, happy, and good natured, in spite of the fact that their daily toil subjected them to the severest of hardships and the most frugal fare."[5] An even more impressive account of endurance sustained by coca is given by von Tschudi: "A Cholo of Huari, named Hatun Huamang, was employed by me in very laborious digging. During the whole time he was in my service, viz. five days and nights, he never tasted any food, and took only two hours sleep nightly. But at intervals of two and a half or three hours, he regularly masticated about one half an ounce of coca leaves, and he kept an *acullico* continually in his mouth. I was constantly beside him, and therefore I had the opportunity of closely observing him. The work for which I engaged him being finished, he accompanied me on a two days journey of twenty-three leagues across the level heights. Though on foot he kept up with the pace of my mule, and halted only for the *chaccar*. On leaving me, he declared that he would willingly engage himself for the same amount of work, and that he would go through it without food if I would but allow him a sufficient supply of coca. The village priest assured me that this man was sixty-two years of age, and that he had never known him to be ill in his life."[6]

Coca is equally important in the daily routine of the Indian farmer. The work day of a Quechua Indian during plowing time begins at dawn, when he meets the members

[4] Reichel-Dolmatoff, I. pp. 77–78.

[5] Lloyd, A treatise on Coca, pp. 12–13.

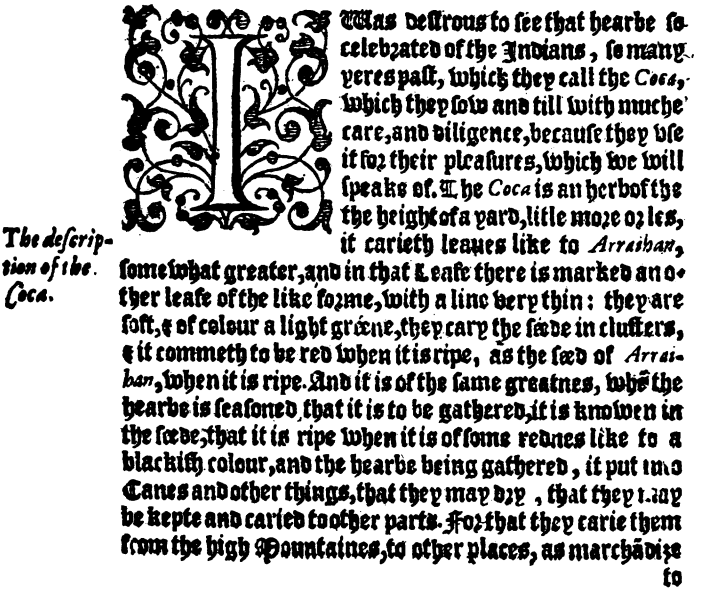
[6] Von Tschudi, p. 453.

FIG. 5. Kubeo woman preparing powdered coca. (Río Kuduyarí, Vaupés, Colombia. Photograph by R. E. Schultes.)

of his work party, and they sit together on the ground chewing coca supplied by the owner of the plot. Work commences soon after, but is interrupted after an hour for another coca chew. At noon, another break is taken for a brief lunch of chuño, potatoes, and sometimes cheese, followed by more coca. After working until two o'clock, the party stops for another chew of coca; the work day ends at five o'clock, when the members of the party return home. In arguing against the suppression of coca in Colombia, Henri Lehmann emphasizes the importance of coca to the Indian farmers, particularly since their fields frequently lie far from their homes, and the Indians eat usually only at dawn and at the end of the work day.

The process of masticating coca, termed *chaccar* or *acullicar* in Peru and Bolivia, is essentially the same now as it was in the time of the Incas. The Indian who is preparing to *acullicar* first relieves himself of his burden and makes himself as comfortable as circumstances permit. He then reaches into his *chuspa*, or woven sack for carrying coca, and, with great deliberation and evident satisfaction, he withdraws the leaves one by one, sometimes removing the midrib, and places the leaves in his mouth, chewing and turning them until they form a ball or quid (the *acullico*), which is held between the cheek and the gums.

He then inserts a small moistened stick or needle into a small tin container or more frequently a calabash gourd (known as an *ishcupuru* in Peru and a *poporo* in Colombia), which contains an alkaline mixture, variously known as *llipta*, *tocra*, or *mambe*. This alkaline substance varies according to regional availability of materials; it may be composed of quicklime, powdered calcareous shells or ashes obtained by burning the stalks of the quinoa plant (*Chenopodium quinoa* L.), the barks of various trees, a woody cactus, or even *Musa* root—the ashes being made into a paste for use. This alkaline mixture is then carefully introduced into the quid of coca leaves, care being taken not to cauterize the lips and mouth


Of the Coca.

I Was deſirous to ſee that hearbe ſo celebrated of the Indians, ſo many yeres paſt, which they call the *Coca*, which they ſow and till with muche care, and diligence, becauſe they uſe it for their pleaſures, which we will ſpeake of. The *Coca* is an herbe of the the height of a yard, litle more or les, it carieth leaues like to *Arrahan*, ſomewhat greater, and in that leafe there is marked an other leafe of the like forme, with a line very thin: they are ſoft, & of colour a light grene, they cary the ſæde in cluſters, & it commeth to be red when it is ripe, as the ſæd of *Arrahan*, when it is ripe. And it is of the ſame greatnes, whē the hearbe is ſeaſoned, that it is to be gathered, it is knowen in the ſæde, that it is ripe when it is of ſome rednes like to a blackiſh colour, and the hearbe being gathered, it put into Canes and other things, that they may dry, that they may be kepte and caried to other parts. For that they carie them from the high Mountaines, to other places, as marchādize to

The deſcription of the Coca.

(Figure 6—part 1)

FIG. 6. Early description of the medicinal uses of coca in Monardes' "Joyfull Newes out of the Newe Founde Worlde." (Fol. 102–103, London, 1596.)

and apparently facilitates the release of the desired active principles. The leaves are kept in the mouth with the lime, while the juice trickles into the stomach: in other words, the leaves are never actually chewed. The average coquero will consume between one and two ounces of coca daily in this manner.

The only significant divergence from this method of mastication is found among the tribes of the Amazon Basin. In this region, the coca leaves, known as *ipadú* in Brazil, are roasted on the mandiocca oven and afterwards ground into a fine green powder in a large cylindrical wooden mortar. Often, a small quantity of tapioca is added to give it consistency, and the finely sifted ashes of the *imbaúba* or *yarumo* tree (various species of *Cecropia* and *Pourouma*) are thoroughly mixed with the green powder. An unusual modification of this procedure was observed by Schultes among the Tanimuka of the Igarapé Peritomé on the Río Apaporis in Colombia. Long slender tubes of the rolled and partly dried leaves of *Ischnosiphon* are tamped half full with small lumps of the whitish resin of *Protium heptaphyllum* March. An Indian then lights the tube and inserts the burning end into the still glowing pile of *Cecropia* ashes; by blowing vigorously on the tube, he causes the balsamic incense to permeate the ashes, imparting a very strong flavor to the ash, which is then mixed with the pulverized coca.

Perhaps the most controversial aspect of the use of coca leaves is the question of its effect on the health of the Indians. The Indians almost universally regard coca as a food, from which they derive actual sustenance. On the other hand, many modern observers have assumed that coca acts merely to anaesthetize the sensory feeling of hunger without aiding nutrition in any way, and some have condemned coca as actually producing malnutrition among the Indians. However, the Indians rarely use

are brought from the West Indias. Fol. 102

to be solde, they barter and change them for Mantelles, and Cattel, and Salt, and other things which runne like monie amongst vs, they plant the seede in *Almaciga*, and from that they take them vp and set them in other places, into Earth that is wel laboured or tilled, and made conuenient to set them in by their lines and order, as we do set here a Garden of Beanes, or of Peason.

The vse of it amongst the Indians is a thing generall, for many things, for when they trauell by the way, for nede and for their content when they are in their houses, they vse it in this forme. They take Cockles or Oysters, in their shelles, and burne them and grinde them, and after they are burned they remaine like Lime, very small grounde: then they take the Leaues of the *Coca*, and chewe them in their Mouthes, and as they chewe it, they mingle with it some of the ponder made of the shelles in such sorte, that they make it lyke to a Paste, taking lesse of the Pouder then of the hearbe, and of this Paste they make certeyne small bawles rounde, and lay them to drie, & whē they will vse them, they take a little Ball in their mouth, and chewe it, rowling it from one place to an other, procuring to conserue it all that they can, and that being done, they take another, and so they goe, vsing it al the time that they haue need, which is when they trauell by the waye, and especially if it bee by wayes where is no meate, nor plentie of water. For the vse of these litle Balles taketh the hunger and thirst from them: & they say that they receiue substaunce thereby, as though they had eate meate. At other times they vse them for their pleasure, although they labour not by the way, and they vse the same *Coca* alone, chewing it & tolling it in their mouths, from one side to another, vntil there be no vertue remaining in it, and then they take another. *The vse of it.*

When they will make themselues drunke, and be out of iudgement, they mingle with the *Coca* the leaues of the *Tabaco*, *Note.*

(Figure 6—part 2)

The thyrde part of the thinges that

Tabaco, and chewe them altogether, and goe as they were out of their wittes, or as if they were drunke, which is a thing that doeth giue them great contentment, to be in that sort. Surely it is a thing of great consideration, to see howe desirous the Indians are to be depriued of their wittes, and to bee without vnderstanding, seeing that they vse thus the *Coca* with the *Tabaco*, and al to this end, that they would by without vnderstanding, and haue their wittes taken from them, as wee sayde in the seconde parte, when wee treated of the *Tabaco*.

(Figure 6—part 3)

coca to the exclusion of other food, although they may make use of the ability of coca to allay hunger when food is scarce or unavailable. This is apparent from Weddel's observations in northern Bolivia: "The Indians who accompanied me in my voyages chewed, in effect, the coca during the entire day; but when evening arrived, they replenished their stomachs like starved men, and I can assure that I have seen them often ingest in one meal, as much food as I would consume in two days."[7] The chemical analysis of coca leaves has shown that they are relatively rich in vitamins, particularly vitamin B_1, riboflavin and vitamin C; in fact, chewing approximately two ounces of coca leaves daily (an average dose) will supply almost a daily vitamin requirement, an important point in view of the great scarcity of fruits and vegetables in the sierra.

Even more important than these considerations, however, is the action of coca in enhancing the assimilation of other foods, by increasing the flow of saliva and gastric secretions and giving strength to the muscles of the gastrointestinal tract. Von Tschudi[8] comments that the food of the Indians consists almost exclusively of vegetable substances, especially roasted maize and barley converted by crushing, which they consume without admixture of any other substance. The continued use of this farinaceous food, he maintains, causes severe obstructions which the well known aperient qualities of the coca counteract, and many serious diseases may thereby be prevented. Furthermore, throughout South America, an infusion of coca leaves is regarded as the remedy par excellence for indigestion, stomach ache and stomach complaints in general. Even Indians who do not regularly masticate the leaves frequently possess a few plants for this purpose alone. Cobo,[9] who listed the medicinal uses of coca by indigenous doctors, mentions that the juice of coca comforts the stomach and aids digestion, and that it removes all gas and pains in the side. The decoction of the leaf drunk regularly is reported to be valuable against laxity of the bowels, and the powder of the leaves mixed with salt and egg white was administered in small quantities to dry out and heal ulcers. The decoction of the seed, drunk with bee honey and *yerba buena*, is mentioned as aiding the relaxation of the stomach and alleviating vomiting.

The coca plant also finds many other uses in alleviating the ills and discomforts of the Indians. Coca has frequently been praised for its beneficial effect on respiration, an important consideration since Peru and Bolivia possess some of the highest inhabited areas of the globe. Dr. Carlos Monge, South America's leading expert on high altitude biology, has noted the direct relation between the frequency of the coca habit and the altitude and emphasizes the important effect that coca has on the physiology of people living at high altitudes. The Indians also administer a coca tea to bring quick relief from the alarming symptoms of nausea, dizziness and severe headache in *soroche*, or mountain sickness, which occasionally results from the low oxygen content of the air and the low atmospheric pressure.

The Indians also consider coca to be effective in preventing infirmities of the teeth and gums. Cobo was among the early chroniclers to draw attention to this application of coca: "Its temperament is hot and dry, with very good stypticity; when chewed regularly, it removes from the teeth all corruption and decay, and makes them white, firm, and strong. It happened to me, that calling one time on a barber to extract a molar, since it pained me very much, the barber said to me that it would be a pity to remove it, since it was good and healthy; and since there was present a religious friend of mine, he counseled me to chew coca for some days. This I did, and with it the toothache left and the tooth remained firm like the rest."[10]

Coca was also widely employed to relieve the pains of rheumatism, headache and external sores. Padre Blas Valera reports that "Coca protects the body from many ailments, and our doctors use it in powdered form to reduce the swelling of wounds, to strengthen broken bones, to expel cold from the body or prevent it from entering, and

[7] Weddel, p. 531.
[8] Von Tschudi, p. 453.
[9] Cobo, pp. 476–477.
[10] Cobo, p. 476.

to cure rotten wounds or sores that are full of maggots."[11] Ruíz, a botanist who did extensive travelling in Peru and Bolivia, mentions that "the natives apply the concoction of this plant with salt in hot baths for oedematous and gouty swellings and for pains in the side; and to relieve the head they take hot infusions of this plant as an aperitive and diuretic remedy to banish gloomy and melancholy choler, to clear the spleen, and to diminish obstructions."[12] Cobo also mentions the use of powdered coca mixed with salt and egg white to consolidate and repair fractures and disintegration of bone and to relieve painful sores. Furthermore, he relates that the Indians say that the seed of coca, taken in vapor, checks all flow of blood from the nose, while the powder of the leaves, mixed in the proportion of two parts powdered coca to one part sugar, is employed to relieve asthma and hoarseness of the chest. Markham also relates that, among *Cinchona* collectors in the forests of Bolivia, coca was more highly valued as a remedy for malaria than the specific which they were engaged in collecting.

Sergio Quijada in his study on the importance of coca in Indian customs relates several interesting medicinal uses of the plant. For irritation of the eyes, masticated coca is placed as a poultice on the eye during the night; in the morning the eye is washed with lukewarm water of roses or chamomile. For sore throat, a gargle is made from an infusion of coca leaves mixed with a little salt, while for headache two or three coca leaves are chewed and placed on the temples, where they are held by a piece of white flannel until the leaves have dried.

Finally, coca is prized by the Indians as an aphrodisiac, a restorative of lost vigor, and a means of insuring longevity. The fact that the Incan Venus was represented as holding in her hand a leaf of coca has been regarded by some authors as symbolic of the reputed aphrodisiac virtues of the plant. Dr. Unanue speaks of "certain coqueros, eighty years of age and over, and yet capable of such prowess as young men in the prime of life would be proud of."[13] Reichel-Dolmatoff reports that this aphrodisiac effect is well known among the Kógi, but, that after a long period of time, it appears to have the opposite effect, since the men frequently lose interest in women. However, it is not clear whether this is due to actual physical impotency or to the fact that the demands of their spiritual life have become more important than women. The Indians of the Sierra are, furthermore, noted for their longevity, with ages of eighty, ninety, and one-hundred years being quite common; the Indians attribute their longevity and robust health to the use of coca which enables them to resist disease and prevent bodily decay. Von Tschudi mentions that, in the sierra, Indians frequently live to well over one hundred years and makes the following comment: "Setting aside all extravagant and visionary notions on the subject, I am clearly of the opinion that the moderate use of coca is not merely innoxious, but that it may even be very conducive to health. In support of this conclusion, I may refer to the numerous examples of longevity among Indians, who, almost from the age of boyhood, have been in the habit of masticating coca three times a day, and who in the course of their lives have consumed no less than 2,700 pounds; yet, nevertheless enjoy perfect health. I allude here to individuals (and such cases are by no means singular) who have attained the great age of 130. Supposing these Indians to have begun to masticate coca at ten years old, and calculate their daily consumption as a minimum of an ounce, the result is the consumption of 2,700 pounds weight in 120 years."[14] I have personally encountered such examples of longevity among coca users in the western Amazon; on the Rio Napo in Peru, I met a Huitoto Indian, reportedly over 120 years of age, who claimed that he had chewed coca since he was three years old and had never been sick a day in his life.

Because of the general skepticism of medical doctors today with regard to herbal remedies, it is doubtful that many modern doctors would be as convinced of the curative properties of the coca leaf as are the South American Indians. However, during

[11] Garcilasso, p. 509.
[12] Ruíz, p. 198.
[13] Unanue, 1794.
[14] Von Tschudi, p. 452.

FIG. 7. "Mama Coca Presenting the 'Divine Plant' to the Old World." An aquarelle by Robida. (Frontispiece to Mortimer's *History of Coca.*)

the latter part of the 19th Century, when doctors in the United States and Europe were more familiar with herbal remedies, coca preparations were extensively used therapeutically for many diverse disorders, and coca enjoyed wide popularity as the basis for various stimulant-tonic preparations, as anyone familiar with the history of Coca-Cola well knows. Coca was widely valued by physicians for its depurative

properties in ridding the blood of waste products of metabolism, particularly uric acid. Coca preparations also were widely employed to treat neurasthenia, nervousness, depression, rheumatism, cardiac irregularities and cardiac weakness, stomatitis, throat infections, asthma and numerous other disorders, and many physicians reported very beneficial results in professional journals. However, even in this period, a prejudice was beginning to form against coca because of rumors of the "cocaine habit." Dr. Mortimer of New York, who employed coca leaves in his practice for nearly 30 years, lamented the reluctance of his contemporaries to recognize the value of coca in the following terms: "That spirit of antagonism which seems rampant at the very suggestion of progress has caused its allies to rehabilitate and magnify the early errors and superstitions whenever opportunity might admit, together with those newer accessions of false premises engendered through shallowness of investigation. Every department of science has been subjected to similar instances of annoyance, though it would appear that medicine is particularly more subject to such influence."[15] The concluding remarks of Dr. Henry Schweig in his article "New Remedies" are very revealing as to the nature of the origin of the prejudice against coca: "The vagaries and wild delusions of writers (non-professional, of course) for the daily press have done much to poison the popular mind regarding coca, and this often proves a serious drawback to the physician. The few cases in which 'cocaine' has been abused have served as a basis for launching forth a wild and wholesale condemnation of a valuable drug. Not one instance has come to my knowledge in which any preparation of coca, intelligently employed, except the alkaloid, has produced even the faintest toxic symptoms. As well discard morphia, chloral, cannabis indica, and the bromides, for the reason that they count the victims to their abuse by the thousands every year. All potent medicinal agents are placed in our hands to be intelligently and temperately employed, not to excess, and the medical man who would hesitate to call to his aid a medicinal agent for no other reason than it is abused, should be, in my estimation, classed with that horde of fanatics who would interdict the use of alcoholics on the ground of their abuse by a small minority of the population."[16]

The reputation that coca use constitutes an addiction only slightly less pernicious than that of opium has remained with the coca leaf and has been the basis for many national and international controls being placed on its distribution and use. Even use of the pure alkaloid cocaine, however, will not produce the same physical addiction as opiates, characterized by the need to increase dosage periodically and by drastic physical withdrawal symptoms. And the distinction between the employment of coca leaves in their crude form by the Indians of South America and the usage of cocaine is even greater. Coca leaves were employed in South America for two thousand years before the discovery of cocaine without producing any marked toxic results. The occasional reports of extreme overindulgence in coca by some coqueros with resulting damage to their physical vigor and mental health represent clearly exceptional cases, and they are certainly not more prevalent than cases of alcoholism and nicotinism in our society. Although an Indian accustomed to chewing coca will, out of preference, return to his habit whenever possible, the Indians of the sierra who are drafted for military service where coca chewing is not permitted do not show any withdrawal symptoms on leaving off the drug. Furthermore, there is no clinical disease which is directly attributable to coca. Although many pathological defects have been suggested as possibly attributable to coca chewing—hyponutrition, ocular disturbances, enlarged thyroid glands and lymph nodes, hepatomegaly, glossitis, stomatitis, and various degenerative stigmata—it remains to be shown which of these conditions, if any, can be attributed solely to the detrimental effects of chewing of the leaf, particularly because, in such cases, it is difficult if not impossible to separate the effects of coca chewing from those of malnutrition, alcoholism, lack of education and social exploitation.

[15] Mortimer, p. 10.

[16] Schweig, Henry, "New Remedies," 1886.

The easiest way to resolve the conflicting reports on the effects of coca use is to recognize the fact that, like any other potent medicinal agent, coca is beneficial when used appropriately and is detrimental when used to excess. Linnaeus considered that a medicine differed from a poison more in its dose than in its nature, and this precept seems applicable to the coca leaf. Another source of confusion is the fact that the effects of the coca leaf often have been presumed to be embodied in the alkaloid cocaine, albeit in a more potent form, with the result that the majority of the physiological research for the last 50 years has been performed solely with cocaine and not with other preparations of coca leaves. However, many physicians have emphasized that the effects of these two are not identical, and particularly that the therapeutic qualities of coca are not represented completely in the active principle cocaine. An important consideration in this regard is that active principles and particularly alkaloids can exert quite different effects when administered as they are naturally combined in the plant than when administered singly in pure form. Very little is known about the physiological activity of the associate alkaloids of the coca plant, and still less about their effects in combination. The necessity of looking into the possible importance of these other compounds is emphasized by the fact that an Indian will frequently reject the bitter coca leaves with the highest percentage of cocaine in favor of the sweeter leaves which are richer in the more aromatic alkaloids. Dr. Henry Rusby, a professor of materia medica sent to Bolivia by Parke, Davis and Co., was among the first to notice this subtle yet important distinction: "It only remains for me to point out that the relative amount of cocaine contained in native coca leaves exerts no influence in determining the Indian's selection of his supply. As a matter of fact, the ordinary conditions to which the leaves are subject during their first two or three months after they are gathered have but little effect on their initial percentages of cocaine. The Indian, however, makes his selection from among such leaves with the greatest care, eagerly seeking the properly dried leaves from some favorite cocal, whose produce is always most readily bought out, and absolutely rejecting other leaves, notwithstanding that the percentages of cocaine may be almost identical."[17]

Although physicians may disagree as to the various effects of the coca leaf, the Indian himself is too familiar with its effects to be bothered by this confusion. Centuries of empirical application of coca have taught the Indian the proper uses of the leaf and the appropriate dosage to be taken for the desired effects. Furthermore, since the South American Indian in general does not have access to well supplied pharmacies, he must rely for the most part on his traditional herbal remedies to preserve his health and treat his ills. For the Indian, coca leaves provide the same benefits that aspirin, coffee, tea, stimulants, sedatives, and numerous other medicaments supply in our society.

In conclusion, I will repeat that coca is an integral part of the Indians' way of life, deeply involved with his traditions, his religion, his work and his medicine. To deny the use of coca to the Indians is as serious a disregard for human rights as would be an attempt to outlaw beer in Germany, coffee in the near east or betel chewing in India. The recent attempts to suppress and control the use of coca can be interpreted only as the latest step in the white man's attempt to exterminate the Indian way of life and make him completely dependent on the alien society and economy which has gradually surrounded him. Henri Lehmann has very accurately stated the severity of the problem in the conclusion to his paper, "The Suppression of the Sale of Coca in Colombia": "The prohibition of the sale of coca is a step forward in the Indians' dependence, it is a step toward his complete enslavement. It is the duty of all the Indian Institutes to interfere in the policy of their administrations to the end that such steps shall not be taken, before it is too late. For several years now, the fight against the Indians has taken new forms. With the pretext of liberating the Indian, for example, many communal lands were dissolved, which has permitted the whites to buy up

[17] Mortimer, p. 183.

Indian lands and evict the natives. The fight against coca by means of such methods as we have here described, has turned upon the very people it is trying to safeguard."[18]

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[18] Lehmann, p. 31.

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